

Patent Claims

1. Genetically modified plant cell, characterised in that it exhibits increased activity in at least one OK1 protein in comparison to corresponding wild type plant cells that have not been genetically modified.
2. Genetically modified plant cell according to Claim 1, wherein the genetic modification consists of the introduction of at least one foreign nucleic acid molecule into the genome of the plant.
3. Genetically modified plant cell according to Claim 2, wherein the foreign nucleic acid molecule codes an OK1 protein.
4. Plant cell according to one of Claims 1 to 3, which synthesises a modified starch in comparison to the corresponding wild type plant cells that have not been genetically modified.
5. Genetically modified plant cell according to Claim 4, wherein the modified starch is characterised in that it has an increased starch phosphate content and/or a modified phosphate distribution.
6. Genetically modified plant cell according to Claim 5, wherein the modified starch is characterised in that it has a modified C-3 phosphate to C-6 phosphate ratio.
7. Plant containing genetically modified plant cells according to one of Claims 1 to 6.
8. Plant according to Claim 7, which is a starch-storing plant.
9. Plant according to Claim 8, which is a maize plant or wheat plant.
10. Propagation material from plants according to one of Claims 7, 8, or 9, containing plant cells according to one of Claims 1 to 6.
11. Harvestable plant parts of plants according to one of Claims 7, 8, or 9, containing plant cells according to one of Claims 1 to 6.
12. Method for the manufacture of a genetically modified plant, wherein

- a) a plant cell is genetically modified, whereby the genetic modification leads to an increase in the (enzymatic) activity of an OK1 protein in comparison to corresponding wild type plant cells that have not been genetically modified;
 - b) a plant is regenerated from plant cells from step a); and
 - 5 c) if necessary, additional plants are produced with the help of the plants according to Step b).
13. Modified starch obtainable from a genetically modified plant according to one of Claims 7, 8, or 9, from propagation material according to Claim 10, or from harvestable plant parts according to Claim 11.
- 10 14. Method for the manufacture of a modified starch including the step of extracting the starch from a plant cell according to one of Claims 1 to 6.
15. Method for the manufacture of a modified starch including the step of extracting the starch from a plant according to one of Claims 7, 8, or 9.
- 15 16. Method for the manufacture of a modified starch including the step of extracting the starch from harvestable plant parts according to Claim 11.
17. Method for the manufacture of a derived starch, wherein starch modified, according to Claim 13 or obtainable through a method according to one of Claims 14, 15, or 16, is derived.
- 20 18. Use of genetically modified plants according to one of Claims 7, 8, or 9 for the manufacture of a modified starch.
19. Derived starch obtainable based on a method according to Claim 17.
20. Use of modified starch according to Claim 13 or obtainable by way of a method according to one of Claims 14, 15, or 16 for the manufacture of derived starch.
21. Flours containing modified starch according to Claim 13.
- 25 22. Flours obtainable from plant cells according to Claims 1 to 6, from propagation material according to Claim 10, or from harvestable plant parts according to Claim 11.

23. Method for the manufacture of flours including the step of grinding parts of plants according to Claims 7, 8, or 9, or of propagation material according to Claim 10, or harvestable material according to Claim 11.
24. Use of genetically modified plant cells according to one of Claims 1 to 6, or of plants according to one of Claims 7, 8, or 9 for the manufacture of flours.
25. Nucleic acid molecule coding a protein with the enzymatic activity of an OK1 protein, selected from the group consisting of:
- a) Nucleic acid molecules, which code a protein with the amino acid sequence indicated under SEQ ID NO. 2 or SEQ ID NO 4;
 - b) Nucleic acid molecules, which code a protein that has an amino acid sequence with an identity of at least 60% with the amino acid sequence indicated under SEQ ID NO: 2 or SEQ ID NO 4;
 - c) Nucleic acid molecules, which contain the nucleotide sequence shown under SEQ ID No. 1 or SEQ ID NO 3, or which contain a sequence complementary to these sequences;
 - d) Nucleic acid molecules, which have an identity of at least 60% with the nucleic acid sequences described under a) or c);
 - e) Nucleic acid molecules, which, under stringent conditions, hybridise with at least one strand of the nucleic acid molecules described under a) or c);
 - f) Nucleic acid molecules, which have a divergent nucleotide sequence from the sequence of the nucleic acid molecules mentioned under a) or c), due to degeneration of the genetic code; and
 - g) Nucleic acid molecules, which represent fragments, allelic variants, and/or derivatives of the nucleic acid molecules listed under a), b), c), d), e), or f).
26. Nucleic acid molecule according to Claim 25, characterised in that an OK1 protein codes from *Arabidopsis* or an OK1 protein codes from rice.
27. Recombinant nucleic acid molecule containing a nucleic acid molecule according to one of Claims 25 or 26.

28. Vector containing a nucleic acid molecule according to one of Claims 25, 26, or 27.
29. Vector according to Claim 28, wherein the nucleic acid molecule is linked with regulatory sequences, which initiate the transcription in prokaryotic or eukaryotic cells.
30. Host cell, which is genetically modified with a nucleic acid molecule according to one of Claims 25 or 26, with a recombinant nucleic acid molecule according to Claim 27, or with a vector according to Claims 28 or 29.
31. Composition containing nucleic acid molecules according to one of Claims 25 or 26, a recombinant nucleic acid molecule according to Claim 27, or a vector according to one of Claims 28 or 29.
32. Use of a composition according to Claim 31 for the identification of plant cells, which have increased activity of an OK1 protein in comparison to wild type plant cells that have not been genetically modified.
33. Protein, which exhibits starch-phosphorylating activity and needs phosphorylated starch as a substrate.
34. Protein, which needs phosphorylated starch as a substrate and transfers the residual phosphate of ATP to phosphorylated starch.